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PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in the Wireless Control of Selective Switches or the like.

I, ARCHIBALD MONTGOMERY LOW, Captain in His Majesty's Army, of Royal Flying Corps Experimental Works, Feltham, in the County of Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the wireless control of electric switches and the like, and while it is particularly applicable to the wireless control of torpedoes, aeroplanes, airships and other dirigible bodies, it may be applied with equal effect in other wireless control operations.

The object of the present invention is to provide improved means for this purpose such that the control cannot be interfered with by outside influences or by an enemy or any unauthorised person.

The invention consists in the provision of means whereby the switches or the like will not be operated unless a predetermined number of impulses or signals be sent in unit time.

The invention also comprises other details and arrangements hereinafter more particularly described.

The accompanying drawings illustrate one mode of carrying out the invention:—

Figure 1 is a diagrammatic view showing a wireless sending set for selectively controlling switches in accordance with the invention;

Figure 2 is a diagrammatic view showing one arrangement of wireless receiving set in accordance with the invention;

Figures 3 and 4 are respectively an elevation and plan on a somewhat larger scale showing a portion of the apparatus indicated in Figure 2.

Figure 5 is a side view of a detail shown in Figure 3;

Figure 6 is an elevation of a modification of a detail;

Figure 7 is a sectional elevation of Figure 6; and

Figure 8 is a sectional elevation illustrating a further detail.

In carrying my invention into effect in one convenient manner as for example in its application to the wireless control of say four operations, I provide in the sending set (Figure 1) an electrical clock n having four contacts n^1 n^2 n^3 n^4 (corresponding to the four operations to be effected), and in conjunction with such clock I provide four relays o^1 o^2 o^3 o^4 and four switches p^1 p^2 p^3 p^4. The arrangement is such that upon depressing the particular key corresponding to the particular operation that is to be effected, the relay corresponding with such key will be energised, but the circuit will not be completed until the arm q of the clock makes contact with the particular contact corresponding to such operation. For example, if key p^1 be depressed, the relay o^1 will be energised, but the circuit will not be completed until the arm q makes contact with the contact n^1 so that the sending signal will thus be timed for a particular time.

The keys for the circuit may be of the form shown in Figure 8, where the spring-pressed plunger 18, when depressed, is retained in position by the detent 19 engaging the shoulder 20, and the key may be released at the required time by energising the electromagnet 21 to withdraw the detent, the energising of the electromagnet being controlled by the clock or other device to obtain proper timing of the operation of the key.

The sending circuit also comprises the usual aerial r and a member which will be timed to send a given number of signals in unit time for a purpose which will here-

[*Price* 1/-]

inafter be apparent when the receiving circuit is described. In the example illustrated in Figure 1 the signal timing member comprises a rotatable disc *s* having a cam or contact member *t* thereon adapted to make successive contacts with the arm *u*, the number of contacts so made in unit time depending upon the speed of rotation of the member *s*.

A modified form of timing device is shown in Figures 6 and 7 and comprises a rotary disc 9 adapted to be rotated at the proper time through worm 10, worm wheel 11 and friction clutch 12 and carrying a spring-controlled arm 13 adapted to be actuated the required number of times by the stationary projections 14 in order to operate the contact 15 the required number of times per revolution and thus send the requisite number of impulses per unit of time. The necessary connections are made by means of the collector rings 16, and the driving mechanism is allowed to come into play at the proper time by the withdrawal of the pin 17.

The receiving circuit which is illustrated diagrammatically in Figure 2 also comprises an electrical clock *v* having the arm q^1 and four contacts v^1 v^2 v^3 v^4 corresponding to the four contacts in the sending clock *n* and thus to the operations to be effected, the two blocks being synchronised by any convenient means, and in places of the clocks synchronised motors or like devices may be employed, the motors being preferably of the kind kept in tune by a pulsating pendulum device or tuning fork or the like.

In the receiving circuit I provide an inertia wheel *w* spring-controlled or otherwise loaded and adapted to be actuated by a pawl *x* engaging a ratchet *z* formed with or connected to the wheel *w*, the loading of the latter being so adjusted that it cannot be rotated for the full distance for which it is designed unless it receives a prescribed number of impulses in unit time, the number corresponding with the number of impulses or signals sent by the timing device *s* in the sending circuit.

For example, the inertia wheel *w* may be timed to be rotated through a prescribed distance if it receives, say, fifteen impulses per second, in which case the timing device *s* would be arranged to send fifteen signals per second, such signals being received by the relay 1 adapted to actuate the pawl *x* controlling the inertia wheel *w*. The latter may be adapted to actuate a rotary switch of usual form or, as shown in the drawings, it may be adapted to actuate a spring-controlled or other suitable arm or member 2 which is provided in conjunction with an inclined plate as shown, one side 3 being of insulating material while the other side 4 is of conducting material. The arrangement is such that if the relay 1 receives the prescribed number of impulses per unit time, the wheel or disc *w* is rotated and by means of the pin 4^1 acting upon one end of the pivoted arm 2 causes the latter to move up the insulating part 3 and, when the wheel *w* has performed its full movement, the arm 2 moves over the top part of the plate and comes into contact with the conducting member 4 so that, if the arm q^1 of the clock *v* at that moment makes contact with the prescribed contact, the corresponding one of the four relays 5, 6, 7, 8 is operated and the impulse needed to effect the corresponding wireless control is thus sent, it being understood that the relays 5, 6, 7, 8 also correspond to the operations to be effected.

If, on the other hand, the relay 1 does not receive the prescribed number of impulses per unit time, the wheel *w* will not be moved through the prescribed distance but will return to its initial position (due to the loading of the inertia wheel), and the arm 2 will simply slide back along the insulating surface 3 and no contact with the conducting surface 4 will be made.

It will be understood that the foregoing details of construction are given by way of example only and that the arrangement of the various parts may be suitably modified to suit any given requirements. Furthermore, any necessary adjuncts or appurtenances may be included in the circuits as, for example, dash-pot relays may be employed if slow impulses are received through the clock or through the synchronous motor, while if a rapidly moving clock is employed any suitable device may be added so that if the apparatus is such that two operations would be effected simultaneously, the device cuts out the main current and thus the holding down of his key by an enemy operator will produce no ill effects.

Any other suitable form of device may replace the synchronous clocks or motors for obtaining correct timing, as, for example, I may employ a helix or coil suspended and adapted to contact periodically with mercury in a mercury cup, or I may use a brass or other suitable wheel or disc with a steel bob spring like a balance wheel, the arrangement being such that at the end of a swing an electric contact is made and a coil is energised and swings the contrivance in the reverse direction and so on. Again, I may use an ordinary clock train driving several wheels with different numbers of teeth operating contacts by means of a pivoted arm, one end of which carries a roller actuated by the last wheel in the train.

In order further to safeguard against outside interference I may have a number of inertia wheels of variable speed, only one being correctly adjusted to pick up the timed signals and actuate the mechanism. Again, the inertia wheel may have its teeth cut irregularly so that it will require a signal or combination of signals of particular form to operate; or I may have two inertia wheels side by side and arranged in conjunction with a contact member so that the same will be operated only when the wheels rotate with the same speed.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In the wireless control of selective switches, the provision of means whereby such switches will not be operated unless a prescribed number of signals be sent in unit time, substantially as described.

2. In the wireless control of selective switches, the provision of an inertia wheel adapted to control a master switch and so adjusted that such switch will not be operated unless the mechanism rotating the inertia wheel receive a prescribed number of impulses per unit time, substantially as described.

3. In the wireless control of selective switches by means as claimed in Claim 2, forming the master switch as a spring-controlled or other arm adapted to wipe an inclined plate, one side of which is insulating while the other is conducting, substantially as described.

4. In the wireless control of selective switches, and the like as claimed in Claim 2, the provision of means for preventing the operation of the master switch if the inertia wheel receive too many impulses in unit time, substantially as described.

5. Improved mechanism for the wireless control of selective switches, substantially as hereinbefore described and as illustrated by the accompanying drawings.

Dated this 4th day of June, 1918.

MARKS & CLERK.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1923.

[This Drawing is a reproduction of the Original on a reduced scale.]

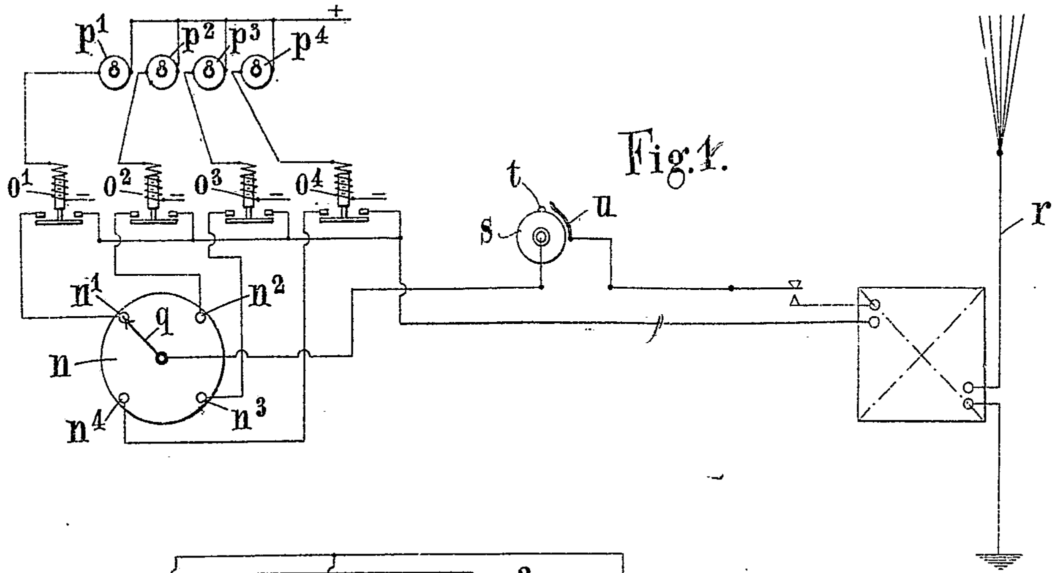

Fig. 1.

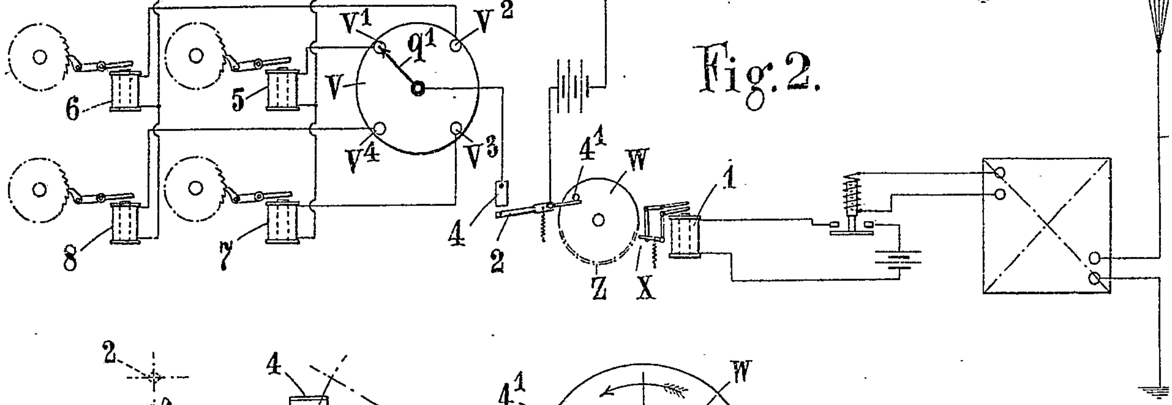

Fig. 2.

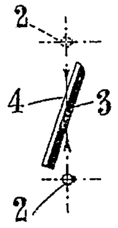

Fig. 5.

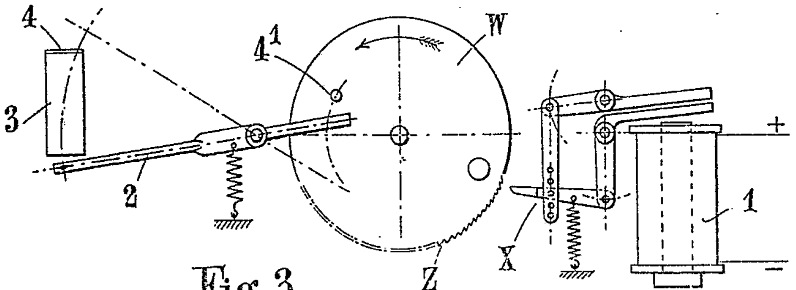

Fig. 3.

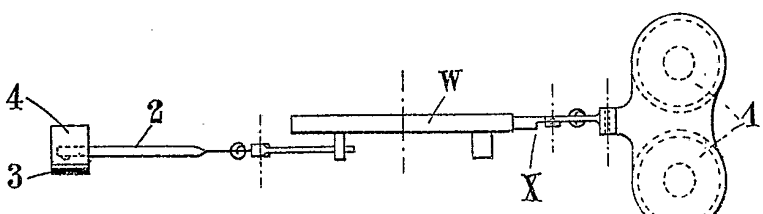

Fig. 4.

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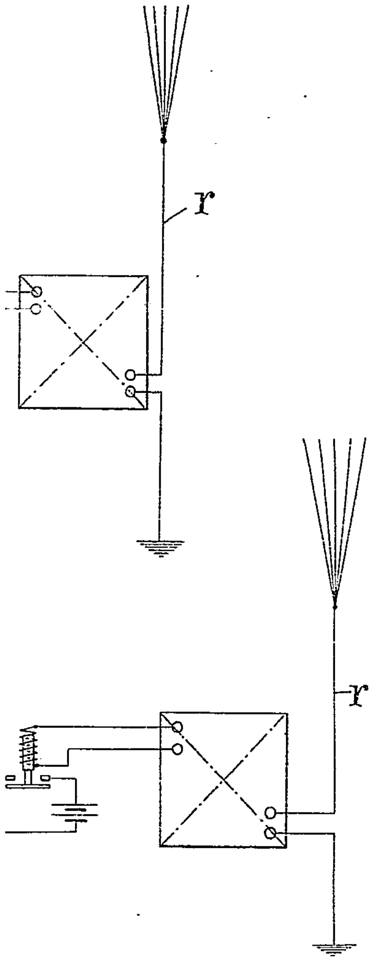
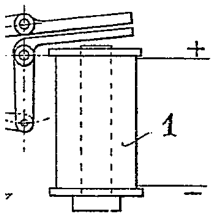
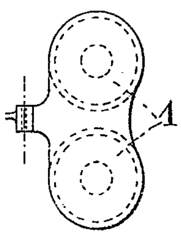






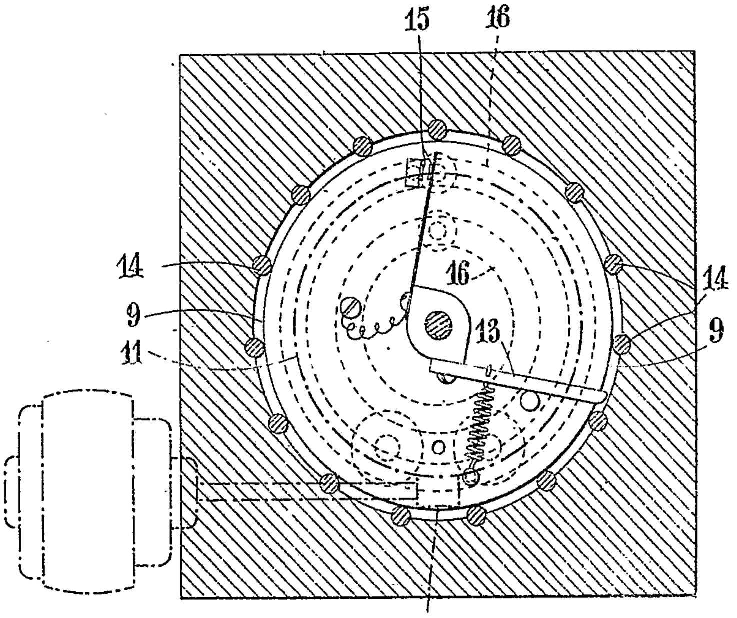
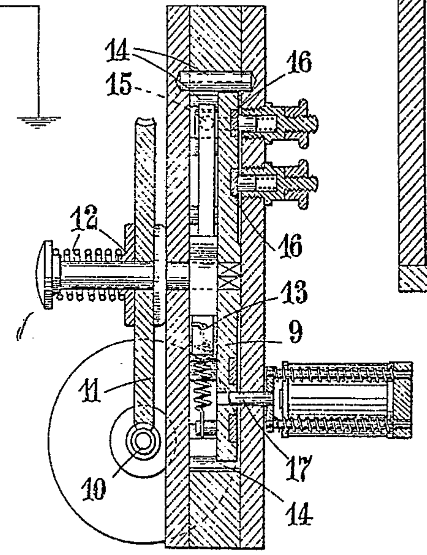


Fig. 6.



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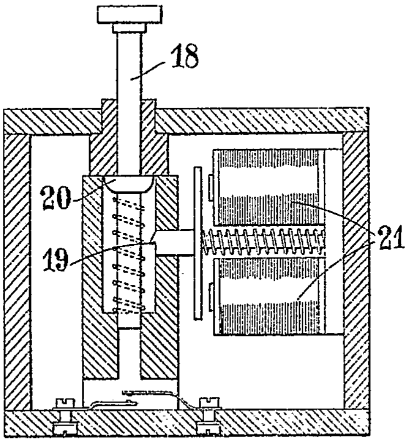

Fig. 8.

Malby&Sons, Photo-Litho.

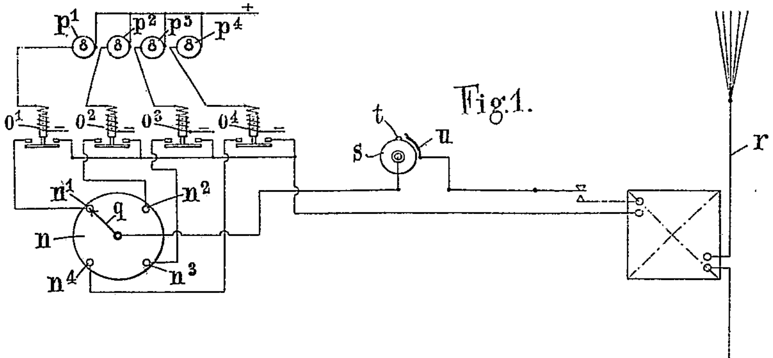

Fig.1.

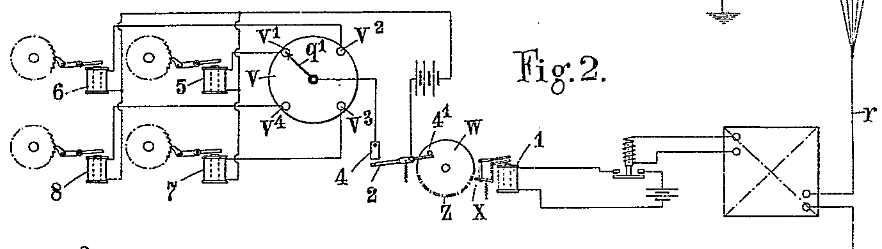

Fig.2.

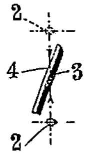

Fig.5.

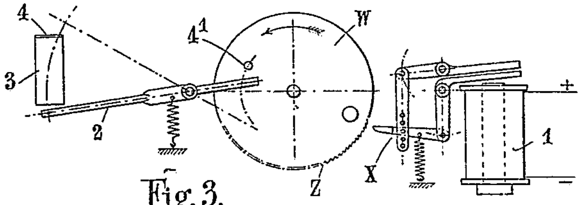

Fig.3.

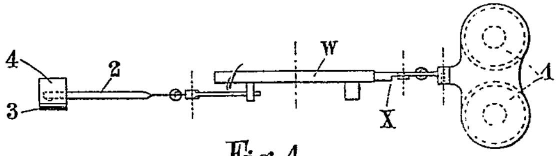

Fig.4.

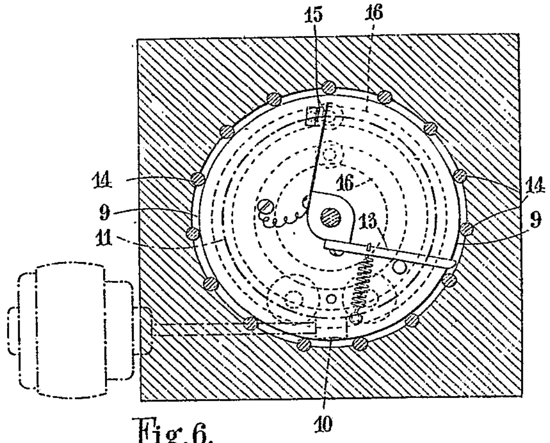

Fig.6.

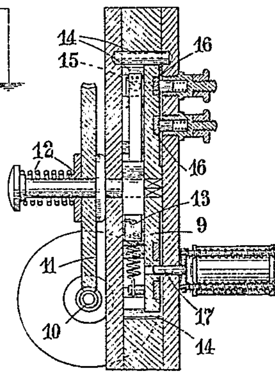

Fig.7.

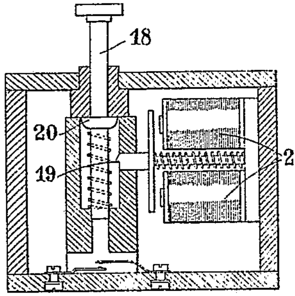

Fig.8.

[This Drawing is a reproduction of the Original on a reduced scale.]